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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,948	11/03/2003	Ari Karkkainen	4090-9	5027

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EXAMINER

INGHAM, JOHN C

ART UNIT PAPER NUMBER

2814

DATE MAILED: 10/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/698,948	Applicant(s) KARKKAINEN, ARI	
	Examiner John C. Ingham	Art Unit 2814	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9, 10, 12-33 and 35-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9, 10, 12-33 and 35-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/31/06</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. The amendment to the specification and claims filed 31 July 2006 have been entered.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **9-10 and 26 and 28-30 and 33** are rejected under 35 U.S.C. 102(b) as being anticipated by Ambrosy (US 2002/0031306).
4. Regarding claims **9-10 and 26**, Ambrosy discloses in Fig 2B an optical assembly comprising: first and second optical components (laser diode item 2, waveguide 6), each having an optical confinement region and an optical axis (10) in use, and each having a bonding surface (¶23); and a planar shared substrate (1), wherein said at least first and second optical components are flip chip mounted on the shared substrate (¶23) by means of their bonding surface and supported by the shared substrate such that their respective optical confinement regions are optically coupled in use (¶07) and at least the first component (diode and waveguide 6) comprises a spacing layer (portions of 2 and 6 below axis 10, ¶22) which determines the distance from the bonding surface to the optical axis for the first component to achieve said optical coupling in use.
5. With regards to claims **28-30**, Ambrosy discloses in Fig 2B an optical assembly comprising at least first and second optical components (laser diode item 2, waveguide

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6) mounted in optical alignment with each other, each component comprising at least one layer and a substrate (below and above axis 10, respectively) and providing an optical confinement region in use (3 and 6), wherein the optical assembly further comprises a planar shared substrate (1), the first and second optical components each being flip chip mounted (¶23) so that its optical confinement region lies between its respective substrate (above axis 10) and the shared substrate, and wherein the components comprise a spacing layer (below axis 10) between the optical confinement region and the shared substrate, said spacing layer being of a depth to provide said optical alignment.

6. With regards to claim 33, Ambrosy discloses the assembly of claim 9 wherein the first component (2) is provided with an electrical connection (11) by means of its bonding surface (12).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims **9-10, 17-18 and 26-33** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gupta (US 5,379,359).

10. Regarding claim **9**, Gupta discloses an optical assembly in Fig 5 and Fig 6 comprising: first and second optical components (laser diode items 38-46, waveguide 60, col 4 ln 30-34), each having an optical confinement region and an optical axis in use, and each having a bonding surface (Fig 5 item 51, Fig 6 item 68); and a shared substrate (30, 62), wherein said at least first and second optical components may be flip chip mounted on the shared substrate (Fig 5, Fig 6) by means of their bonding surface and supported by the shared substrate such that their respective optical confinement regions are optically coupled in use (col 4 ln 30-34) and at least the first component (diode) comprises a spacing layer (38) which determines the distance from the bonding surface to the optical axis for the first component to achieve said optical coupling in use (Fig 4, col 3 ln 54-58).

Gupta does not show in Fig 5 or Fig 6 wherein both components are flip chip mounted onto the shared substrate. However, Gupta does specify that either component may be flip chip mounted, and also recites in column 1 lines 30-33 that conventionally, components are formed separately as discrete structures and mechanically aligned by edge coupling (see Fig 1), which is particularly efficient (col 1 ln 34). It would have been obvious to one of ordinary skill in the art at the time of the

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invention that at least two components, as shown in Figure 1, may be flip chip mounted onto a shared substrate and mechanically aligned for good coupling efficiency.

11. Regarding claim **10**, Gupta discloses in Fig 5 and Fig 6 an assembly according to claim 9 wherein the shared substrate (30, 62) provides a planar surface (dotted line) on which both first and second components are flip chip mounted to achieve optical coupling in use.

12. With regards to claim **17**, Gupta discloses in Figure 5 the assembly of claim 9 wherein the spacing layer (38) provides the whole distance between the bonding surface (68) and the optical confinement region.

13. Regarding claim **18**, Gupta discloses in Figure 6 the assembly of claim 9 wherein the spacing layer (44) provides only part of the distance (partly provided by contact 46) between the bonding surface (68) and the confinement region.

14. Regarding claim **26**, Gupta discloses the assembly of claim 9 wherein the first component comprises a laser diode (col 3 ln 29).

15. Regarding claim **27**, Gupta discloses the assembly of claim 9 wherein the laser diode comprises gallium arsenide, a III-V material.

16. With regards to claim **28**, Gupta discloses in Figures 1, 5 and 6 an optical assembly comprising at least first and second optical components mounted in optical alignment with each other, each component comprising at least one layer and a substrate (55, 30) and providing an optical confinement region in use, wherein the optical assembly further comprises a shared substrate (Fig 5 item 30, Fig 6 item 62), the first and second optical components (Fig 6 item 38-46 and Fig 5 item 53) each being flip.

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chip mounted so that its optical confinement region lies between its respective substrate (55, 30) and the shared substrate (as seen in discrete components of Fig 1).

17. Regarding claim **29**, Gupta discloses in Figures 5 and 6 the assembly of claim 28 wherein the shared substrate (30, 62) comprises a planar surface on which the first and second optical components are mounted.

18. With regards to claim **30**, Gupta discloses the assembly of claim 28 wherein the first optical component (Fig 6 items 38-46) comprises a spacing layer (44) between the optical confinement region (42) and the shared substrate (62), said spacing layer being of a depth to provide optical alignment (col 3 ln 54-57).

19. Regarding claim **31**, Gupta discloses the assembly of claim 28 wherein the substrate comprised by the first component (30) has different characteristics from the substrate (55) comprised by the second component (30 is GaAs, 55 is LiTaO<sub>3</sub>).

20. Regarding claim **32**, Gupta discloses in Figure 1 the assembly of claim 31 wherein the substrate (22) comprised by the first component (10) has a different depth from the substrate (26) comprised by the second component.

21. With regards to claim **33**, Gupta discloses the assembly of claim 9 wherein the first component (38-46) is provided with an electrical connection (46) by means of its bonding surface (Fig 6).

22. Claim **12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ambrosy and Tada (5,684,902). Ambrosy discloses the assembly according to claim 9, wherein the distance from the bonding surface to the optical axis for the first component (thickness of item 2 under axis 10) is different from the bonding surface to the optical

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axis for the second component (thickness of item 6 under axis 10), but does not specify the shared substrate providing a non-planar surface on which both first and second components are mounted.

Tada teaches in Figure 1 a structure wherein the substrate (1) has a groove (2) cut into it for mounting of the second component (6), the groove allowing automatic and accurate positioning of the second component (col 1 ln 45-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the non-planar surface of Tada on the device disclosed by Gupta in order to accurately position a component.

23. Claims **13 and 38** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ambrosy and Tada as applied to claim 12 above, and further in view of Glebov (US 6,922,508). Ambrosy and Tada do not disclose wherein a glass material having both organic and inorganic components provides the non-planar surface.

Glebov teaches the use of organic/inorganic glass hybrids (col 6 ln 15-20) as cladding layers and substrates (col 4 ln 20) due to its high transparency (col 6 ln 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Glebov (a hybrid glass substrate) on the device disclosed by Ambrosy and Tada for a highly transparent substrate.

24. Claims **14-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ambrosy as applied to claim 9 above, and further in view of Blauvelt (US 6,987,913). Gupta does not disclose wherein the distance from bonding surface to optical axis for the two components is within 300nm, or 100nm. Blauvelt teaches that the desired



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objectives of optical junctions are vertical position accuracies of 20nm (col 8 ln 58-59), and teaches a structure of passively aligned photodiodes and waveguides (Fig 20B). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Blauvelt on the structure of Gupta, to mount two optical components with optical regions aligned within 20nm of each other, since optical power transfer can be maintained above the 90% level in this arrangement (col 8 ln 60).

25. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Glebov. Gupta discloses an optical assembly according to claim 9, but does not disclose wherein the material of the spacing layer (fabricated layer) comprises a hybrid glass material (having both organic and inorganic components). Glebov teaches that cladding layers may be made of glassy hybrid materials (col 6 ln 15-20), since these materials are highly transparent (col 6 ln 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Glebov (a clad layer of glass) on the device disclosed by Gupta for high transparency.

26. Claims 19-22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Glebov as applied to claim 16 above, and further in view of Nashimoto (US 6,816,660). Gupta and Glebov do not disclose wherein the glass material comprises an inorganic matrix provided in part by a metal alkoxide or salt that has been hydrolyzed.

Nashimoto teaches that glass may be formed by applying metal salts by a sol-gel method and heated (col 11 ln 32-36), producing an extremely smooth thin film with low light loss (col 11 ln 40- 42). Various types of metals and organic compounds are used

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in metal salts, including those in groups 3A, 3B, etc. of the periodic table. Although the claim language "wherein the glass material is adapted to be processed..." describes a product by process (see MPEP 2113), Nashimoto teaches that the glass material is processed at a temperature ranging from 100° to 500°C

27. Claim **23** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta, Glebov, and Nashimoto as applied to claim 21 above, and further in view of Kaneko. Gupta, Glebov, and Nashimoto fail to specify that the glass material comprises a thermal initiator to polymerize the glass material.

Kaneko teaches a method of making an optoelectronic material comprising a thermal initiator (silane chloride) for polymerization (abstract), which has an easily controllable refractive index (col 3 ln 38-39).

28. Claims **35-37** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ambrosy as applied to claim 28 above, Tada as applied to claim 12, and further in view of Glebov as applied to claim 13. Ambrosy and Tada disclose a non planar (discontinuous) shared substrate, but do not disclose wherein an optical cladding layer of the first component and a support surface for the second component are provided by areas of a layer fabricated on the shared substrate, and wherein a glass material having both organic and inorganic components provides a non-planar, or discontinuous, surface.

Glebov teaches the use of organic/inorganic glass hybrids (col 6 ln 15-20) as cladding layers and substrates (col 4 ln 20) due to its high transparency (col 6 ln 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to

use the teachings of Glebov (a hybrid glass substrate) on the device disclosed by Ambrosy and Tada for a highly transparent substrate which also acts as a cladding layer for the first component and a support surface of the second component.

### ***Response to Arguments***

29. Applicant's arguments with respect to claims 9-11, 17-18, 26-33, and 35-37 have been considered but are moot in view of the new ground(s) of rejection. However, since Gupta teaches that either component may be flip chip mounted (Fig 5, Fig 6) and also that conventionally both components are discrete (Fig 1), it is obvious that both components may be flip chip mounted as discussed above.

### ***Conclusion***

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Taneya (US 5,488,678), Koh (US 6,628,854), and Maxwell (US 6,778,718) each teach mounting discrete optical components onto a shared substrate, and Maxwell and Koh illustrate that the components may be flip chip mounted onto a non-planar surface.

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

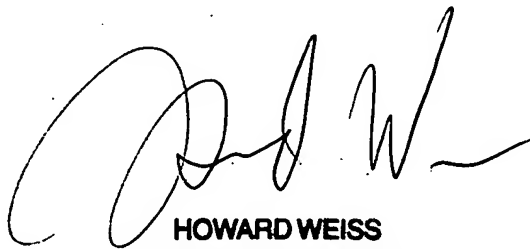
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John C Ingham  
Examiner  
Art Unit 2814

jci



**HOWARD WEISS**  
**PRIMARY EXAMINER**